

BRAMMER[®]

MANUFACTURING COMPANY

P.O. Box 3547 • Davenport, Iowa 52808 • (319) 326-2585 • Fax (800) 334-7230

Living Kitchens

March 24, 1995

RECEIVED

MAR 27 1995

IOWA SECTION

Mr. Lyndell Harrington
Chief, RCRA Branch,
U. S. Environmental Protection Agency, Region VII
726 Minnesota Ave.
Kansas City, Kansas 66101

Dear Mr. Harrington:

In response to the Notice of Violation Pursuant to Requirements of the Resource Conservation and Recovery Act received by Brammer Manufacturing Company (EPA ID Number IAD005264940), 1441 Rockingham Road, Davenport, IA 52802, from David N. Whiting, on March 10, 1995, I can report the following corrective actions taken and/or schedule for completion, as a follow up to my letter of March 17, 1995:

5. "40 CFR 265.34 Inadequate access to alarm or communication device at container storage areas."

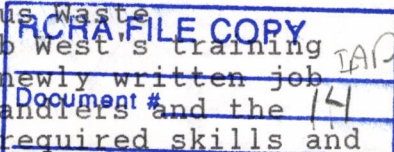
See the facility layout, Attachment A, please. We had a phone installed just inside the door to the Tin Shed (identified as "1") next to the hazardous waste storage area (identified as "2") on March 21, 1995. We have combined our storage of hazardous wastes in the Tin Shed by moving an accumulation drum from the pump room (identified as "3").

We have a satellite accumulation drum for paint sludge at our topcoat carousel (identified as "4"). There is a phone visible from this drum about 45 feet away (at "5"). The walking distance to this phone is about 72 feet.

Our phones are all capable of working as an interior alarm via our public address system and they are all capable of contacting external emergency assistance.

8. 40 CFR 265.16(d) No written description of personnel training."

Brammer feels we have recently completed training and documentation as required. Attachment B is a list of employees in the Hazardous Waste Handler position. This is also a training log for training completion. Attachment C is a copy of a memo announcing in the last paragraph that Bob West is the Hazardous Waste Technician. Attachment D documents Bob West's training in two pages. Attachments E and F are newly written job descriptions for the Hazardous Waste Handlers and the Hazardous Waste Technician which list required skills and



RCRA RECORDS CENTER

education. The next eighteen pages, Attachment G, are our new spill response training program.

In summary, Brammer feels we have properly addressed the above two violations by March 24, 1995 as I committed to in our letter of March 17, 1995.

I would like to repeat our commitment to address the following items by April 15, 1995:

1. "40 CFR 262.11 Inadequate hazardous waste determination on:

2. Cardboard on spray line."

2. Brammer contacted an outside lab to make the hazardous waste determination on the cardboard. The lab will take at least two weeks for their tests. I will send you a copy of the results by April 15, 1995. This material will stay in use and not be disposed of until we make the determination.

9. "40 CFR 265.52(c) Inadequate contingency plan description of arrangements with local authorities."

Brammer is updating the contingency plan to assure compliance. We will complete the update and I will send you a copy by April 15, 1995.

10. "40 CFR 265.52(d) Inadequate emergency coordinator list information."

Brammer is updating the contingency plan to assure compliance. We will complete the update and I will send you a copy by April 15, 1995.

11. "40 CFR 265.52(e) No emergency equipment list & description in contingency plan."

Brammer is updating the contingency plan to assure compliance. We will complete the update and I will send you a copy by April 15, 1995.

We continue to work hard to improve our waste handling procedures.

Sincerely,
BRAMMER MANUFACTURING COMPANY

Chip Hawkinson

Chip Hawkinson
Quality Control Manager/Safety Director
cc Mr. Terry Dickey, Brammer Manufacturing Company

Attachment A

ROCKINGHAM ROAD

BRAMMER POLE BUILDING
HEIGHT 31.6
84' x 180'

PARKING

ROOF HATCH

NEW
BUILDING

MAIN
BUILDING
HEIGHT 37.6'
245' x 270'

TIN
SHED

LOT

1. Tin shed phone
2. Hazardous waste storage
3. Pump room.
4. Satellite accumulation drum.
5. Phone

MID-AMERICA GLASS CO.
HEIGHT 29.1'
245' x 270'

chip
3/20/95

Attachment B

March 22, 1995
Given by Robert West

Spill Response Training

<u>Name</u>	<u>DATE</u>
LARRY & DOUGLAS	3-22-95
Ben Hensler	3-22-95
Diana Stawc	3-22-95
Mike Fox	3-22-95
Tim Chase	3-22-95
Sharon Wescom	3-22-95
Wale Hilloch	3-22-95
Rawson Ruston	3-22-95
Yes Peteres	3/22/95
Thick et miter	3/22/95
Chip Hawkinson - Chr Hawkin	3/22/95
Francis J. Galala	3-22-95
alt ben luf	3-22-95

The above are hazardous waste handlers.

BRAMMER MANUFACTURING COMPANY

INTER-OFFICE MEMO

TO: ALL EMPLOYEES
FROM: TERRY DICKEY
DATE: 03-04-94
SUBJECT: CHANGING ASSIGNMENTS

Attachment C

As we are moving ahead with change, and constantly trying to optimize our opportunities throughout, the evaluation of whether we are staffed most effectively is also constant. After much thought and discussion, the decision to reassign certain people in the finishing areas has been made.

Effectively Monday, March 7, Bob West will be responsible for all of the finishing and other operations on the Flatline, 2nd Floor, and 3rd Floor. Ben Hensler will be foreman over the Specials area on 2nd, and the operations on 3rd Floor. He will report directly to Bob West. June will be foreman over the balance of 2nd Floor, and will also report directly to Bob West.

To assist in covering the Flatline, there will be a posting for a working Lead Person. This opens up some additional opportunities, as well, for those interested. The Flatline will be staffed with two Leads reporting directly to Bob West.

This change gives us the opportunity to take advantage of the strengths, and to be able to better provide for the needs on the shop floor, maximizing communications, and allowing us to do our jobs better, and with the highest morale.

Over the next couple of days, there will be a brief department meeting to discuss the changes, and make sure that reporting lines and all else is clear.

Other changes at this time are having Bob West formally take over the role of Hazardous Waste Technician. As Bob is taking over these responsibilities, Chip Hawkinson will be formally assuming the role of Safety Manager. Both of these areas are ever increasing in their impact on our business, and having the responsibilities specifically assigned is more effective than our present arrangement.

Terry

Eastern Iowa Community College District

CLINTON COMMUNITY
COLLEGE

MUSCATINE COMMUNITY
COLLEGE

SCOTT COMMUNITY
COLLEGE

COMMUNITY EDUCATION

This is to certify that

ROBERT

WEST

has completed a40.00..... clock hour course in

40 HR HAZARDOUS WASTE SITE WOR

on.....JAN. 28.....19 94

AT

SCOTT COMMUNITY COLLEGE

John T. Henry
.....
Chancellor

Nancy K. Krenkel
.....
Director of Community Education

70428

Attachment D

File

Hazardous Materials Training and Research Institute

ROBERT WEST

has completed and passed a course in

8 HOUR WASTE SITE WORKER REFRESHER

Date of Certificate: JANUARY 30, 1995
Certificate Number: 480-70-3650
Expiration Date: JANUARY 30, 1996
Examination Date: NA

Contact Hours: 8
Course Location: SCOTT CC URBAN CENTER, DAVENPORT, IA
Date of Course: JANUARY 30, 1995
Respirator Name & Model: NA

JEFF CLARK

Instructor

#72734

PAT BERNTSEN

Program Director

Training for this program was developed and delivered by the:
Hazardous Materials Training and Research Institute

Kirkwood Community College
6301 Kirkwood Blvd. S. W.
P.O. Box 2068
Cedar Rapids, IA 542406
(319) 398-5677

Eastern Iowa Community College District
306 West River Drive
Davenport, IA 52801-1221
(319) 322-1545

Attachment E

Job Description Hazardous Waste Handler

Hazardous waste handlers will properly handle hazardous waste: including filling, labeling, moving and storing containers, and following Brammer's spill response plan. They will be given on the job training and will successfully complete the spill response training program within 6 months of job assignment. They will do other duties as assigned by their hazardous waste supervisor, the hazardous waste technician.

Hazardous waste handlers will do other jobs at Brammer under other supervision.

CP 3/24/95

Attachment F

Job Description Hazardous Waste Technician

The hazardous waste technician will oversee RCRA compliance. He will train and supervise the hazardous waste handlers on their waste related duties and do required inspections. He will make hazardous waste determinations and manifest hazardous waste shipments. He will demonstrate an understanding of the relevant federal code and RCRA regulations gained through experience and on the job training or through outside education. He will report to the Executive Vice President of Operations.

CL 3/24/95

Attachment 4

SPILL RESPONSE TRAINING MANUAL

Course outline:

1. Each trainee will read the manual.
2. The trainer will reinforce important parts in the manual.
3. Hands on practice with a spill with critique by group.
4. Questions and answer.

265.304, 265.347, 265.377, 265.403, 265.1033, 265.1052, 265.1053, and 265.1058, where applicable.

(c) The owner or operator must remedy any deterioration or malfunction of equipment or structures which the inspection reveals on a schedule which ensures that the problem does not lead to an environmental or human health hazard. Where a hazard is imminent or has already occurred, remedial action must be taken immediately.

(d) The owner or operator must record inspections in an inspection log or summary. He must keep these records for at least three years from the date of inspection. At a minimum, these records must include the date and time of the inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions.

(Approved by the Office of Management and Budget under control number 2050-0013)

[45 FR 33232, May 19, 1980, as amended at 50 FR 4514, Jan. 31, 1985; 57 FR 3491, Jan. 29, 1992]

EFFECTIVE DATE NOTE: At 57 FR 3491, Jan. 29, 1992, § 265.15 was amended by revising paragraph (b)(4), effective July 29, 1992. For the convenience of the reader, the superseded text is set forth below.

§ 265.15 General inspection requirements.

(b) ***

(4) The frequency of inspection may vary for the items on the schedule. However, it should be based on the rate of possible deterioration of the equipment and the probability of an environmental or human health incident if the deterioration, or malfunction, or any operator error goes undetected between inspections. Areas subject to spills, such as loading and unloading areas, must be inspected daily when in use. At a minimum, the inspection schedule must include the terms and frequencies called for in §§ 265.174, 265.193, 265.195, 265.226, 265.347, 265.377, 265.403, 265.1033, 265.1052, 265.1053, and 265.1058.

§ 265.16 Personnel training.

(a)(1) Facility personnel must successfully complete a program of class-

room instruction or on-the-job training that teaches them to perform their duties in a way that ensures the facility's compliance with the requirements of this part. The owner or operator must ensure that this program includes all the elements described in the document required under paragraph (d)(3) of this section.

(2) This program must be directed by a person trained in hazardous waste management procedures, and must include instruction which teaches facility personnel hazardous waste management procedures (including contingency plan implementation) relevant to the positions in which they are employed.

(3) At a minimum, the training program must be designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems, including where applicable:

(i) Procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment;

(ii) Key parameters for automatic waste feed cut-off systems;

(iii) Communications or alarm systems;

(iv) Response to fires or explosions;

(v) Response to ground-water contamination incidents; and

(vi) Shutdown of operations.

(b) Facility personnel must successfully complete the program required in paragraph (a) of this section within six months after the effective date of these regulations or six months after the date of their employment or assignment to a facility, or to a new position at a facility, whichever is later. Employees hired after the effective date of these regulations must not work in unsupervised positions until they have completed the training requirements of paragraph (a) of this section.

(c) Facility personnel must take part in an annual review of the initial training required in paragraph (a) of this section.

* (d) The owner or operator must maintain the following documents and records at the facility:

(1) The job title for each position at the facility related to hazardous waste management, and the name of the employee filling each job;

(2) A written job description for each position listed under paragraph (d)(1) of this Section. This description may be consistent in its degree of specificity with descriptions for other similar positions in the same company, location or bargaining unit, but must include the requisite skill, education, or other qualifications, and duties of facility personnel assigned to each position;

(3) A written description of the type and amount of both introductory and continuing training that will be given to each person filling a position listed under paragraph (d)(1) of this section;

(4) Records that document that the training or job experience required under paragraphs (a), (b), and (c) of this section has been given to, and completed by, facility personnel.

(e) Training records on current personnel must be kept until closure of the facility. Training records on former employees must be kept for at least three years from the date the employee last worked at the facility. Personnel training records may accompany personnel transferred within the same company.

(Approved by the Office of Management and Budget under control number 2050-0013)

[45 FR 33232, May 19, 1980, as amended at 50 FR 4514, Jan. 31, 1985]

§ 265.17 General requirements for ignitable, reactive, or incompatible wastes.

(a) The owner or operator must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including but not limited to: Open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g., from heat-producing chemical reactions), and radiant heat. While ignitable or reactive waste is being handled, the owner or operator must confine smoking and open flame to specially designated locations. "No Smoking" signs must be conspicuously placed wherever

or there is a hazard from ignitable reactive waste.

(b) Where specifically required in other sections of this part, the owner or operator must ensure that the management, storage, or disposal of ignitable, reactive, or incompatible waste, and the mixing or commingling of incompatible or incompatible wastes and materials must be conducted so that it does not

(1) Generate extreme heat, fire, or explosion, or violent reaction;

(2) Produce uncontrolled toxic fumes, dusts, or gases in sufficient quantities to threaten human health;

(3) Produce uncontrolled flames or fumes or gases in sufficient quantities to pose a risk of fire or explosion;

(4) Damage the structural integrity of the device or facility containing the waste; or

(5) Through other like means, threaten human health or the environment.

§ 265.18 Location standards.

The placement of any hazardous waste in a salt dome, salt bed, or underground mine or cave is prohibited, except for the Department of Energy Waste Isolation Pilot Plant in New Mexico.

[50 FR 28749, July 15, 1985]

§ 265.19 Construction quality assurance program.

(a) CQA program. (1) A construction quality assurance (CQA) program is required for all surface impoundments, waste pile, and landfill units that are required to comply with §§ 265.254, 265.254, and 265.301(a). The program must ensure that the construction meets or exceeds all design and specifications in the permit. The program must be developed and implemented under the direction of a professional engineer who is a registered professional engineer.

(2) The CQA program must include the following physical components, where applicable:

(i) Foundations;

(ii) Dikes;

(iii) Low-permeability soil liners;

(iv) Geomembranes (flexible or rigid);

Training of Brammer Manufacturing Company on spill response according to CFR40 265.16 personnel training.

- (a)(1) This block of instruction will ensure that the personnel involved are following in the Facility's Compliance Program.
- (2) The person directing this block of instruction, Robert West, has been trained in Hazardous Waste Management and has completed a class in Contingency Planning.
- (3) At the end of this block of instruction the employee will be able to respond effectively to emergency at hand, be familiar with the emergency procedure in a spill, and the equipment Brammer Manufacturing Company has on hand to handle a spill.
 - (I) Handle by Spill Response Coordinator any repairing, inspection of spill equipment monthly.
 - (ii) N/A there are no automatic waste feed cut-off systems.
 - (iii) Alarm systems are the fire alarm system which alerts entire plant and phone systems with enhanced 911 system.
 - (iv) Response to fire or explosion falls under emergency response plan for fire.
 - (v) Response to ground water contamination will be handled by Spill Response Coordinator if applicable and a reportable quantity has been spilled.
 - (vi) Shut down of operations will be decided by the severity of the spill.
- (b) Personnel hired, promoted, or reassigned must be supervised until they are properly trained in spill response. The individuals mentioned above will be trained within 6 months of being hired, promoted or reassigned.
- (c) Annual refresher course on the initial training will be conducted by the Spill Response Coordinator.
- (d) The following records, documents will be maintained by the Human Resource Department.
 - (1) The job title for each position at Brammer that relates to Hazardous Waste Management and the name of the individual filling the job.
 - (2) A written job description for each person listed under paragraph (d)(1).

- (3) A written description of the type and amount of both introductory and continuing training that will be given to each person filling a position listed in (d)(1).
- (4) Documentation that the training or job experience has been given to Brammer Manufacturing Company personnel regarding spill response.

Spill Response Plan

Purpose of the spill response Plan:

The purpose of spill response plan is to comply with OSHA standard 29CFR 1910.1200 and 29 CFR 1910.120 and title III SARA regulations and provide advance information and give direction in order to be prepared for emergencies. Before they arise. This plan has been formulated with the employee's safety and well being in mind. All employee's are required to become familiar with the provisions of this spill response plan.

Emergency Spill Response Coordinator
Foreman Robert West
Back up Spill Response
Chip Hawkinson

FACTORS EFFECTING RESPONSE

There are five factors effecting the response of humans and other living things to toxic chemicals :

The Chemical Itself. Some chemicals produce immediate and dramatic biological effects. Others may produce no observable effects at all or the effects may be delayed in their appearance.

Type of Contact. Certain chemicals appear harmless after one type of contact (skin, for example), but may have serious effects when contacted in another way (lungs, for example). Carbon monoxide would be an example of this kind of contact-dependent effect.

Chemical Dose. The dose of a chemical exposure is simply related to the chemical amount and time period exposed.

Individual Sensitivity. Humans and other living animals vary in their response to any exposure to a chemical substance. For some, a certain dose may produce symptoms of serious illness; for others, only mild symptoms may appear, or there may be no noticeable effect at all. Often, a prior exposure to a chemical effects the way that an individual responds to being exposed at a later time. Thus there is not only variation between different individuals, there may be different responses in the same individual at different exposures.

Wastesite Worker

- What happened:
 - Type of incident.
 - Cause of incident.
 - Extent of chemical release and transport.
 - Extent of damage to structures, equipment, and terrain.
- Casualties:
 - Victims (number, location, and condition).
 - Treatment required.
 - Missing Personnel.
- What could happen? Consider:
 - Types of chemicals on site.
 - Potential for fire, explosion, and release of hazardous substances.
 - Location of all personnel on site relative to hazardous areas.
 - Potential for danger to offsite population or environment.
- What can be done? Consider:
 - Equipment and personnel resources needed for victim rescue and hazard mitigation.
 - Number of uninjured personnel available for response.
 - Resources available on site.
 - Resources available from outside groups and agencies.
 - Time for outside resources to reach the site.
 - Hazards involved in rescue and response.

- Set up onsite emergency first-aid stations; see that they are well supplied and restocked immediately after each emergency.

EMERGENCY RESPONSE PROCEDURES

Response operations usually follow a sequence that starts with the notification of trouble and continues through the preparation of equipment and personnel for the next emergency.

Notification

Alert personnel to the emergency. Sound a site alarm to:

- Notify personnel.
- Stop work activities if necessary.
- Lower background noise in order to speed communication.
- Begin emergency procedures.

Notify onsite emergency response personnel about the emergency and include essential information:

- What happened.
- Where it happened.
- Whom it happened to.
- When it happened.
- How it happened.
- The extent of damage.
- What aid is needed.

Size-Up

Available information about the incident and emergency response capabilities should be evaluated. The following information should be determined, to the extent possible:

SPILL CONTROL PROCEDURES

Procedure for Large Spills

- A. Large spills are over five gallons. Large spills must be reported to the Emergency Response Coordinator.
- B. Flammable spills of more than one drum, or that are at unusually risk of fire, explosion, or location, must be handled by the Davenport Fire Department. Activate the Emergency Response system.
- C. Shutdown and/or remove from the area any operations which might generate heat or sparks or cause congestion. Remove employees who are not involved in the clean up.
- D. Immediate clean up must be accomplished to reduce the safety hazard and prevent spreading.
- E. Notify supervisors through out the plant about the spill as a need to evacuate the plant could develop.
- F. If material is flammable or combustible, bring the necessary fire extinguishing equipment and fire brigade members to the area.
- G. Activate ventilation system if available. Insure adequate movement to the outside with approved fans or open doors or windows if necessary.
- H. Use gloves, respirators (if trained and authorized), boots and other personal protective equipment as necessary.
- I. Use absorbent. (Dirty stain wiping rags, clean wiping rags, sawdust, oil dry)
- J. Scoop up the spilled material with cardboard or a shovel and put into a proper waste receptacle. Appropriately handle those materials classified as hazardous waste.
- K. Mop up with appropriate cleaning solution, as needed.
- L. Wipe up with rags and dispose of rags properly.
- M. Use water, non-combustible or non-flammable solvent for clean up whenever possible.
- N. If flammable or combustible solvent must be used for mopping (do not flood area), use the smallest quantity possible, but not to exceed 75 square feet wet for combustible solvents and 25 square feet for flammable solvents. It may be necessary to restrict these areas depending on the adequacy of ventilation and the fire and health hazards.

SPILL CONTROL PROCEDURES

Procedure for Small Spills

- A. Small spills are five gallons or less. Small spills must be reported to the Emergency Response Coordinator.
- B. Immediate clean up must be accomplished to reduce safety hazards and to prevent spreading.
- C. Use gloves, respirators (if trained and authorized), boots or other protective equipment as needed.
- D. Use absorbent. (Dirty stain wiping rags, clean wiping rags, sawdust, oil dry)
- E. Activate ventilation system.
- F. If material is flammable or combustible, bring a fire extinguisher all necessary fire brigade members into the area. Keep sources of ignition away.
- G. Turn off any equipment which might be reached by the spilled material.
- H. Scoop up the spilled material with cardboard or a shovel and put into a proper waste receptacle. Appropriately handle those materials classified as hazardous waste.
- I. Wipe up with rags. Place used rags in a proper dirty rag container.
- J. Mop up with appropriate cleaning solution if necessary.
- K. Use water, non-combustible or non-flammable solvents for clean up whenever possible.
- L. Flammable solvent used for clean up must be kept in approved safety containers.
- M. Any mops used with flammable or combustible material must be cleaned, wrung out and hung up to dry in a well ventilated area away from any source of heat, flame or spark.

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2. Keep the work area clean, fewer spills happen in clean work areas.
3. Use protective clothing and equipment when operating procedures call for them, when the MSDS recommends it, or when over exposures are detected or expected.
4. Use only approved and labeled containers for storing and transporting solvents.
5. Make sure there is enough ventilation when using solvents.
6. Keep flammables away from heat and ignition sources.
7. Check that containers and hoses are in good working condition.
8. DON'T leave containers open when not in use.
9. DON'T siphon by mouth.
10. DON'T depend on a "funny smell" to detect hazardous gases in the air - some are odorless.
11. DON'T breathe gases produced from chemical reactions
12. DON'T mix solvents - unless instructed to. Even then, follow instructions exactly and double check that you are mixing the proper materials.
13. DON'T smoke, eat or drink around hazardous substances.
14. DON'T wear contact lenses around toxic vapors.
15. DON'T track hazardous materials from one location to the next.
16. DON'T store hazardous chemicals next to each other without checking the MSDS for possible reactions.
17. DON'T work by yourself, have someone nearby who knows where you are and knows what you're doing at all times.

Wastesite Worker

the skin to the body. Wash skin with soap and water if solvents are spilled on the skin.

Acute Effects of Inhalation

- Irritation of mucous membranes of the respiratory passage
- Nausea
- Headaches and Drowsiness
- Muscular weakness
- Loss of coordination
- Disorientation and Confusion
- Unconsciousness and sometimes Death.

If you encounter an unconscious person near a solvent spill or release:

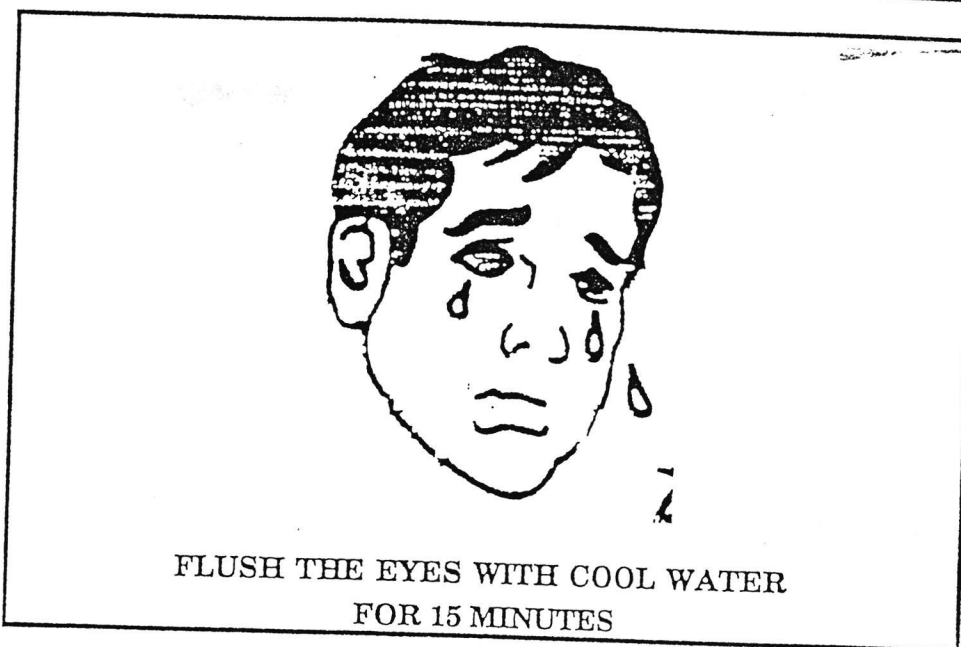
- Call for help immediately.
- Do not attempt a rescue, if there is any reason to believe that the cause is solvent vapor, without wearing proper protective equipment. Have a standby observer present.
- Move the victim to fresh air and give CPR if necessary.
- Make sure the victim gets medical help.

When working around solvents don't
become part of the problem.

DOs And DON'Ts

When working with solvents, follow these DOs and DON'Ts:

1. Read the container label and MSDS before you use the chemical. There will not be time and it may be inconvenient to read it during an accident.



For first aid to an unconscious victim, first call for help. Do not attempt a rescue unless you ventilate the area or use SCBA and have a standby observer. Once you safely reach the victim, move the person to fresh air and give CPR if necessary.

With flammable solvents, fire protection is of primary concern. The proper use of safety cans, grounding and bonding, and flammable storage cabinets is critical. With halogenated solvents, flammability is not a problem, but in a fire the byproducts of decomposing halogenated solvents are deadly.

Acute Effects of Skin/Eye Contact

- Removal of skin oils - irritation
- Cracking and Rashes on the skin
- Dermatitis
- Burning and Irritation of eyes

Remember, if a solvent is splashed into the eyes, it will cause burning and irritation. Raise the eyelids if possible and flush the eyes with cool water for at least 15 minutes.

All solvents will dry out the skin and cause cracking, rashes or dermatitis. The cracking and dermatitis open new routes through

Generally, a spill in the amount of one or more gallons should bring this response. As with all generalities, specific conditions may call for assistance with even smaller spills. One example would be a spill of flammable liquid into a small sump or pit. Far less than a gallon can create a fire hazard in a confining space.

With flammable solvents, the proper use of safety cans, grounding and bonding, and flammable storage cabinets is critical. With halogenated solvents, flammability is not a problem, but in a fire the byproducts of decomposing halogenated solvents are deadly.

SOLVENT HEALTH HAZARDS

Treatment for Exposure

There is no safe solvent; they all have acute and chronic health hazards. All solvents will dry out the skin and cause cracking, rashes or dermatitis. The cracking and dermatitis open new routes through the skin to the body. Wash skin with soap and water if solvents are spilled on the skin.



WASH SKIN WITH SOAP AND WATER
IF SOLVENTS COME IN CONTACT WITH SKIN

If a solvent is splashed into the eyes, it will cause burning and irritation. Flush the eyes with cool water for 15 minutes if a solvent reaches the eyes and raise the eye lids if possible.

There are three factors that are necessary for a fire:

- There must be fuel, something to burn.
- There must be an oxidizer to promote burning.
- There must be an ignition source.

The flash point is the lowest temperature at which a liquid gives off enough vapor to form a flammable mixture with air. Flammable liquids have a flash point below 100°F. Also, of hazard are the Class II combustible liquids, their flash point is between 100°F and 140°F.

The ignition point is the temperature that the vapor must reach to ignite. There is an inverse relationship between flash point and ignition temperature. The higher the flash point the lower the ignition temperature. Gasoline has a low flash point, -40°F and a high ignition temperature, about 850°F. #2 Fuel oil has a high flash point, 120°F and a lower ignition temperature, about 550°F. The significance of this is, if a combustible liquid reaches its flash point, there is a greater chance of ignition or fire.

The minimum concentration of flammable liquid vapor in air necessary for a mixture to ignite is called the lower explosive limit, or LEL. Anything below that limit is too thin, or lean, to ignite. The upper explosive limit or UEL, is the concentration of flammable liquid vapor in air that is too rich, or too thick, to ignite. The flammable, or explosive, range includes everything between the upper and lower explosive limits.

It is possible to detect the presence of hazardous flammable liquid vapors by their smell. However, many flammable liquid vapors are toxic below their detection limit. Explosive gas meters will detect flammable liquids, but meters are not equally sensitive to all gasses, thus any indication of flammable gas should be of concern. Note also that flammable ranges are in percent, one percent is equal to 10,000 parts per million. An explosive gas meter can not be used to detect PEL values.

Whenever flammable liquids are spilled, or whenever combustible liquids are spilled on hot surfaces, in a quantity that can reach the flammable range, the safety office and fire brigade should be notified.

Human error enters the picture when a corrosive is placed in the wrong, or incompatible container. The corrosive goes to work on the metal container and before long the container fails. This has been especially true when dealing with corrosive hazardous wastes.

The other type of reaction that can occur simultaneously with the metal destruction is the production of hydrogen gas. This can be especially dangerous when it occurs inside, simply because of the nature of the hydrogen that is produced. Hydrogen is an odorless, colorless gas that is lighter than air, so as it is produced it will rise. When this occurs within an enclosure, a large amount of hydrogen can be trapped in high locations within that enclosure. If an ignition source is present, a tremendous explosion is possible. If the hydrogen is produced outside, most of it will rise and be diluted by the air. The dilution of the hydrogen by the air almost totally eliminates the potentially explosive build up of the gas.

SOLVENTS

Solvents are grouped into two groups, solvents that burn and solvents that resist burning. Solvents that can burn are generally treated as a flammable material. Most solvents that resist burning are of the halogenated class.

no { Pure halogenated solvents have been in wide use the last twenty years. They do not flash or burn, they have few acute health hazards and their cost has been reasonable. Today the story is changing. Halogenated solvents have been shown to have chronic health hazards; they have also been shown to have an adverse effect on the environment. Many play a roll in the depletion of the ozone layer and are listed as greenhouse gases.

Flammable solvents have also been in use for many years. The physical hazards that they bring to the workplace, in the form of fire and explosion, have been well documented.

SOLVENT PHYSICAL HAZARDS

The primary hazard of flammable liquid solvents is the physical hazard of fire and/or an explosion. Flammability refers to the ability of a material to generate a high concentration of combustible vapors in an unconfined area under normal circumstances.

the combustible is a cellulose material (wood, paper, cotton or any plant type material), a chemical reaction can occur that will produce nitrocellulose. Nitrocellulose is a highly flammable material that is also capable of exploding. When the cellulose burns it will produce toxic gases as well.

Corrosives and Water

The next contact that must be considered is that of corrosives and water. Many of the corrosive materials are also very water reactive. When water comes in contact with a water reactive corrosive, one or more of the following can occur:

- violent reaction
- generation of heat
- production of a vapor cloud
- possible over-pressurization of the container

The over-pressurization of the container is caused by a combination of the first three reactions.

Corrosives and Metal

The final type of contact to be considered is that of a corrosive with a metal. Simply by examining the definition, it becomes evident that one of the possible reactions is the destruction of the metal itself. This is of great importance, when the particular metal under attack happens to be the same metal that makes up the container in which the corrosive is stored. This might sound a little silly, but this type of problem has occurred in the past, and is usually difficult to control. There is usually some form of leakage involving piping or the container itself. The difficulty arises because the involved part is usually in such poor physical condition, from the corrosive attack, that it crumbles when attempts are made to plug it.

The reasons for this type of incident can vary, but the two most common ones are lack of maintenance and human error. Lack of maintenance allows metal parts to become overly corroded and weak. The slightest stress and the metal fails. The stress may simply be the weight of the container or the weight of the corrosive.

HAZARDOUS MIXTURES WITH OTHER MATERIALS

On a hazardous waste site there is the potential for the mixing of different types of materials. Each reaction will be dependent on the specific chemicals involved however some generalities can be made.

Corrosives and Poisons

First, if corrosives come in contact with poisons, such as cyanide or sulfide salts, the primary concern is the possible toxic vapors that could be produced by the decomposition of the poison. The vapors could be more toxic than any of the corrosive vapors themselves.

Corrosives and Flammable or Combustible Materials

A second and more probable contact is that of a corrosive with a flammable or combustible material. There are many possible reactions, with the exact type dependent upon the specific corrosive and flammable/combustible material. The following are several examples of the possible hazards that could be encountered.

When a strong acid or base is mixed with a flammable or combustible liquid, heat will be generated in a manner similar to that seen when water is added to an acid. Because of the increase in temperature, there will also be an increase in the amount of vapor that is generated by the liquid. This means that the liquid, normally at the temperature of its environment, will be warmer than its environment. For instance, a liquid which is normally considered to be below its flash point (the temperature at which enough vapor is produced for a flash ignition to occur), may in fact have been heated to a temperature above its flash point. This means that if enough vapor is present, and if an ignition source is found, a fire will result. The heat generated may also be sufficient to spontaneously ignite liquids that have low ignition temperatures.

As stated before, some corrosives are also strong oxidizing agents as well. If one of the oxidizing type materials comes in contact with a finely divided combustible solid, spontaneous ignition of the combustible may occur. After ignition has occurred, the corrosive will react like an oxidizer, that is, it will greatly intensify the rate of combustion. If the corrosive happens to be nitric acid HNO_3 , and

massive vapor clouds. Most of the time, if a vapor cloud is generated, large scale evacuations, both in area and numbers, are required. The injuries produced will be primarily to the mucus membranes (eyes, throat, and airway) and possibly moist tissues. The moist tissues are those areas of the body that are susceptible to sweating, namely the arm pits, groin, and lower back. Some of the effects of exposure include:

- Eye contact may cause the cornea to become immediately opaque. This condition may be permanent.
- Inhalation may cause bronchitis, chronic inflammation or damage to the upper respiratory tract and to the lungs.
- Severe irritation to the respiratory system and may cause nasal membrane inflammation and destruction.
- Dental erosion, especially the front teeth.

The extent of the injury is dependent on the concentration of the acid, the quantity of acid involved, the body area affected and the duration of the contact. The PEL of any chemical is that concentration to which nearly all workers can be repeatedly exposed without adverse effects. The PEL for sulfuric acid is 1 milligram per cubic meter, mg/m^3 . That is 1 milligram of acid per cubic meter of clean air. This is for a Time Weighted Average (TWA) of 8 hours.

One bright spot to consider when dealing with a corrosive vapor cloud is that, although the vapors are corrosive, irritating, or toxic, the majority are also water soluble. This means that water fog streams could potentially be used to help knock down and disperse the clouds. It is of the utmost importance that the water not be allowed to come in contact with the product itself. Most, if not all, vapor producing corrosives are also water reactive. If contact is made, there is usually an increase in the amount of vapor being generated.

HAZARDOUS MIXTURES WITH OTHER MATERIALS

On a hazardous waste site there is the potential for the mixing of different types of materials. Each reaction will be dependent on the specific chemicals involved however some generalities can be made.

Wastesite Worker

exposure occurs to the eyes, the victim's hands must be restrained while the flushing is being done. Also, the eye lids must be held open for flushing to be effective.

It is of the utmost importance that personnel who work with acids and bases not wear contact lenses, because the lens may become "welded" to the eye itself. Such an occurrence almost always leads to blindness.

Flushing must continue for a minimum of 15 minutes to ensure that all the chemical that can possibly be removed is in fact removed. This also keeps the wound cool and reduces swelling. This applies to the eyes as well as a wound.

After the flushing is completed, the victim should be treated by standard first aid practices for burns. Make sure the victim is transported to a medical facility for further examination by a physician, even if the injury appears to be only minor.

Dusts from some of the solid corrosives are capable of producing both severe internal and/or external injuries also. Massive exposures to some of the strong corrosives can be fatal within a matter of minutes, with little or nothing able to stop it. The injuries are also extremely disfiguring and require extensive healing times and medical treatment. As with any incident,

SAFETY IS YOUR FIRST CONCERN.

Protective Measures Against Skin/Eye Exposure

There can be some benefit in knowing where most common tissue exposures to corrosive materials occur. Not surprisingly, hands rank number one, followed by nose-throat-airway (vapor and dusts), feet, face, and eyes. By knowing these common sites, we can try to protect them.

Vapor Hazards

Probably the most far reaching and devastating hazard, is the ability of many of these materials to produce vapor. This group includes the "fuming" liquids which are actually spontaneous vapor producers. Either way, vapor producers are capable of creating

damage. With still other materials, the exposure may not even be noticed until hours later when the burn is quite severe, and medical treatment is difficult.

Skin damage is said to follow the rule of 9, that is, that a chemical burn is 9 times as damaging as a thermal burn. Also remember that the tissue destruction is caused by chemical action (reaction), and will continue until that chemical action is stopped.



Treatment for Skin Exposure

The best way to stop the chemical action of corrosives is flushing. The reasons for the use of flushing are rather simple. First, physical removal of liquids and finely divided solids is difficult. It also tends to leave small portions of the material behind. Neutralization must be avoided because of the heat it produces. The victim then would have thermal burns on top of the chemical burns. Flushing is by far the best method because it acts to physically remove any material remaining on the tissue and acts to dilute it as well.

There are several things to keep in mind about flushing a chemical burn. Use large quantities of water; most corrosives are quite soluble in water. The water should be applied with little or no pressure to avoid removing injured tissue. The application should be started as soon as possible after the exposure has occurred. A victim of such an exposure will usually be in great pain and usually will require forceful aid to control him while flushing is taking place. If the

Now, if we said we had a fifty percent concentration of HCl, we are saying that we have taken a given amount of the concentrated solution and now mixed it with an equal amount of plain water. If we compare the number of H^+ ions in the concentrated solution with the number of H^+ ions in the 50% solution, we will find that the 50% solution has only $1/2$ the number of H^+ ions as are found in the concentrated solution. Another way of saying the same thing would be to say we "diluted" the concentration of the solution. Other terms, such as molar and normal would be expressed as a 1 molar solution, a 10 formal solution or a .9 normal solution. Remember, the larger the number before the term, the more concentrated the solution.

Organic Acids and Bases

So far we have discussed the groups known as the mineral or inorganic acids and bases. There are also organic acids and bases. The organic acids are composed of carbons and hydrogens attached to one or two carboxyl groups, $COOH$. For example, the acetic acid C_2H_3COOH that was previously used as an example of a weak acid.

There are several important points to keep in mind when looking at the hazards posed by the organic corrosives. First, the vast majority of both the organic acids and bases are not as strong as their mineral counterparts. However, they are still capable of producing severe injuries and damages. Secondly, many of these materials will exhibit additional hazards other than just being corrosive. For example, many are flammable, toxic, irritating, and some are capable of polymerizing (exploding). Read the label and/or MSDS for warnings.

HEALTH HAZARDS AND PROTECTION

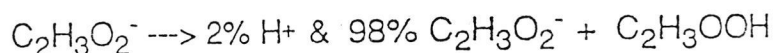
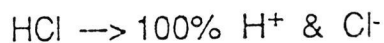
Now that we have an understanding of the general concepts concerning corrosives, let's now consider the primary health hazard that can be encountered when dealing with these types of materials. The first and foremost hazard that a corrosive can produce is the ability to destroy living tissues, referred to as chemical burns. Remember, with any chemical burn, the tissue damage starts the instant the chemical agent contacts that tissue. Some of these materials, particularly the strong acids and bases, are so corrosive that even momentary exposure to the skin will produce severe

A good example is the comparison of hydrochloric acid, HCl, a strong acid, and acetic acid, C_2H_3OOH , a weak acid. When we examine the amount of ionization that occurs in both of these acids, we find that the HCl is 100% ionized, while the C_2H_3OOH is only 2% ionized. What this implies is that the HCl has a much greater number of H^+ ions present in the liquid, than does the C_2H_3OOH . This is of importance, because when an acid is mixed with another material, the H^+ ion is usually what drives the reaction. The same concept also holds true when we consider bases, except that instead of talking about H^+ ions, we are talking about OH^- .

WEAK VS STRONG

STRENGTH OF A CORROSIVE

%IONIZATION WHEN MIXED WITH WATER



CONCENTRATION

Percent, Molar, Formal, Normal

The amount of material in a volume of water

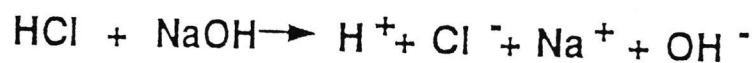
The larger the number, the more concentrated the solution

Now let's examine concentration. There are many different terms used to describe concentration such as percent, molar, formal, normal, etc. The information that all of them provide is basically the same, that is, the ratio of the amount of a material to a given amount of water.

In order to better understand exactly what concentration means to us, let's again consider hydrochloric acid. HCl is a strong acid that is 100% ionized. If we have concentrated HCl, we mean that the liquid material has the maximum amount of HCl dissolved in that particular amount of water. If we were to add any more HCl gas to the solution, no more would or could dissolve, but rather it would just bubble through the liquid and escape.

NEUTRALIZATION

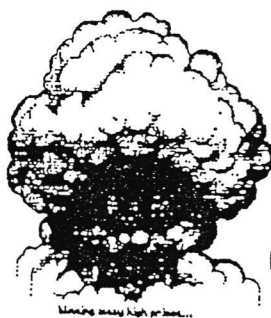
Mixing an Acid with a Base



→

Acid + Base → Salt + Water + HEAT

VIOLENT



REACTION

toxic vapors
irritating gases

Strength and Concentration

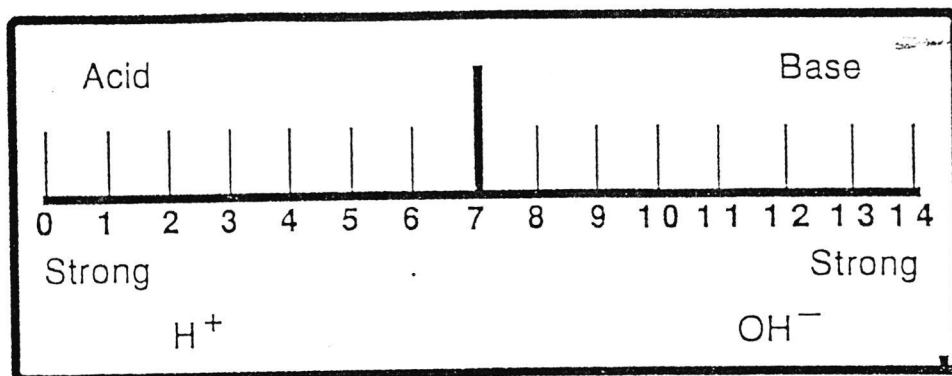
Two other concepts that are important to understand are strength and concentration of acids and bases. (These concepts may also apply to other types of materials as well.) These two concepts are misunderstood and often confused. Their definitions are as follows:

Strength is defined as the percentage of ionization that occurs when a material is mixed with water, expressed in terms of weak and strong.

Concentration is defined as the amount of material that is mixed with a certain amount of water, a ratio of material to water, expressed in terms of percentage by weight or volume.

Let's look at these two concepts separately and in a little more detail. First, let's look at strength, in terms of strong versus weak. A strong acid or base would ionize totally, or almost totally, when with water. A weak acid or base would ionize only to a slight degree when mixed with water.

A good example is the comparison of hydrochloric acid, HCl, a strong acid, and acetic acid, C₂H₃OOH, a weak acid. When we

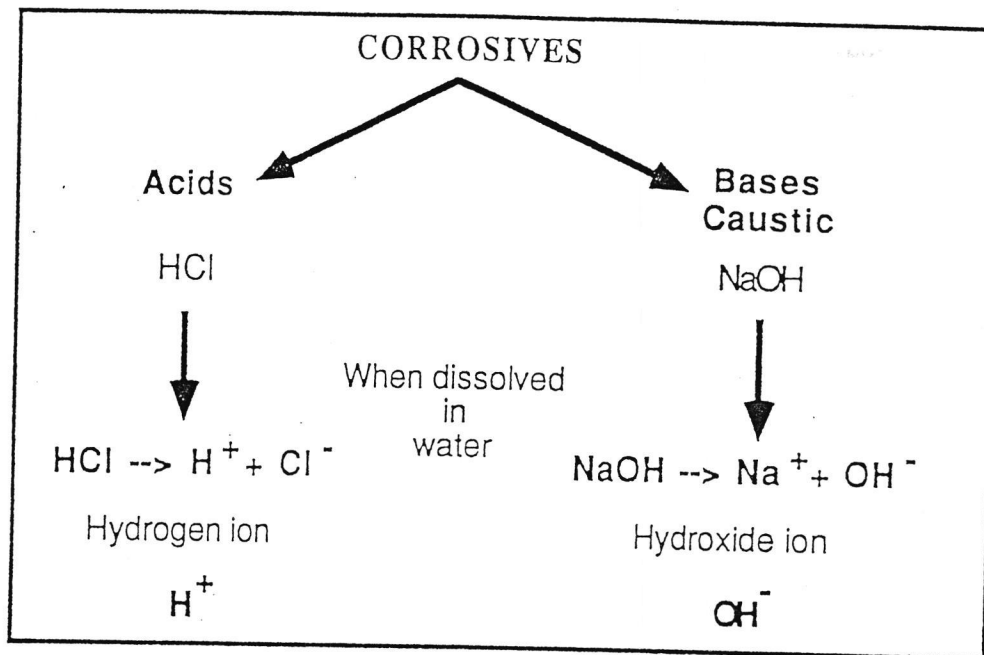


What about the liquids with a pH between 6 and 8? These materials are said to be almost neutral, (7 is considered neutral). If the pH is between 6 and 7, the liquid is slightly acidic. If the pH is between 7 and 8, the liquid is slightly basic.

Mixing Acids and Bases

There are many different kinds of reactions that occur when acids or bases are mixed with other materials. Let's just examine what happens when an acid and a base are mixed. An important point to remember is that the mixing of an acid and a base will produce a violent reaction. The reaction will include the production of a large amount of heat, the splattering of liquid materials and possibly the production of steam explosions, hydrogen gas, and toxic or irritating gases.

(HCl) and sodium hydroxide (NaOH) to help explain their differences. For our purposes all acids will produce an H^+ ion when dissolved in water, and all bases will produce an OH^- ion when dissolved in water.



pH

A term that is often used when discussing acids or bases is the term pH. It is often said that "the liquid has a low or high pH". What is this pH? By definition, pH is the concentration of H^+ , or the number of H^+ ions compared to the number of water molecules, H_2O , found in the liquid. As the concentration of H^+ increases, the pH number decreases. For example, a liquid with a pH of 1.6 has a high H^+ concentration. Or conversely, if a liquid has a pH of 11, its H^+ ion concentration is very, very low. Recall that for our purposes all acids will produce an H^+ ion when dissolved in water. Therefore an acid would have a high concentration of H^+ and a low pH. Bases have very low H^+ concentrations and a high pH. pH ranges from 0 to 14, with the acids on the low end, (0 to 5 or 6), and the bases at the high end, (8 or 9 to 14).

chemical must be understood. It is also helpful for workers to understand and have a basic knowledge of some general types of chemicals. The following provides general characteristics and hazards associated with:

- Corrosives
- Solvents
- Oxidizers
- Water Reactive Materials
- Unstable Materials
- Explosives

CORROSIVE CLASS CHEMICALS

The hazard class corrosives is second only to flammable liquids in use and transport. Sulfuric acid is the most widely used industrial chemical. The members of the corrosive class find their way into every area of this country, no matter how large or small. They are used in everything from flashlight and car batteries, to toilet bowl cleaners; from disinfectants, to rust-proofing agents. It is, therefore, important that we know as much about corrosives and caustics as we possibly can.

ACIDS AND BASES

One definition of a corrosive material is any liquid that has a severe corrosion rate on steel. Obviously if it is capable of destroying steel, it is also capable of destroying human tissue. There are two main types of materials that are capable of causing this destruction; they are known as acids and bases.

Note: Technically speaking, acids are corrosive, and bases are caustic. However, many labels and MSDSs do not distinguish between corrosive or caustic, rather they lump both together under the heading of **CORROSIVE**.

In order to fully understand the materials we are dealing with, it is important that we take a better look at differences between acids and bases. To make it a little easier to see, let's use hydrochloric acid

ELEMENTS THAT SIGNAL POTENTIAL HAZARD

Aluminum	Antimony	Arsenic
Barium	Beryllium	Bromine
Cadmium	Chlorine	Chromium
Cobalt	Copper	Fluorine
Hafnium	Indium	Iodine
Lead	Manganese	Mercury
Molybdenum	Nickel	Platinum
Rhodium	Selenium	Silicon
Silver	Tellurium	Thallium
Tin	Tungsten	Uranium
Yttrium	Zirconium	

In addition to the names of some elements, the presence of certain words and word fragments in the names of chemicals can indicate possible hazards. Not every chemical compound whose name contains these words or word fragments is hazardous, but most are.

WORD FRAGMENTS THAT SIGNAL POTENTIAL HAZARD

acid	acryl	alcohol
aldehyde	allyl	amine
amino	anhydride	brom
caustic	chlor	chrom
cyan	epoxy	fluor
glycol	hydroxide	isocyanate
ketone	mercaptan	nitrile
nitrite	nitro	nitroso
perox	phenol	sulfide
thio	vinyl	

Also chemical names that end in the following fragments: -ite, -ate, and -ide, may signal hazard.

As mentioned earlier, to protect yourself from hazardous chemicals in the workplace you must know the toxicities of the chemicals you are working with. The specific hazards associated with that

Interaction With Other Chemicals. Chemistry is the study of the interaction of various chemicals with one another. An example is the reaction between acids and bases. The physical and biochemistry of the living organism is much the same. Chemicals in combination can produce different biological responses than the responses seen when exposure is to one chemical alone.

WORKING WITH HAZARDOUS CHEMICALS

Hazardous chemicals, hazardous materials, or hazardous substances, as they are variously called, have long been used for many purposes in homes, business and industry. Often the people who use such materials become lax and careless around chemicals. Working with them everyday brings on the comfort of commonplace. For the spill response worker, a basic knowledge of chemical hazard classes, chemical terms and terminology used relative to hazard classes, and a basic chemical hazard awareness is necessary.

Chemical names and terms can be very confusing and misleading. Many times a single letter in the name of a chemical can mean a change from a toxic to non-toxic compound. No spill response worker should ever assume that the hazards of a particular chemical are known without verifying the information. The name must be verified and the hazards must be verified. Verification can come from the label, material safety data sheets, reference books, or from technical specialists. A chemist or other specialist employee should be available to assist in supervision of spill clean-up activities. The chemist should be consulted and must concur with clean-up methods and disposal procedures. The chemist will also need to be consulted when mixtures of chemicals are encountered. If the hazards of a mixture can not be verified, then maximum protective procedures should be used.

CHEMICAL NAMES WITH POTENTIAL HAZARD

The name of a chemical is the first indication of its potential hazard. Even before the label or MSDS is checked the presence of certain elements in the chemical name will suggest the probable existence of hazards. A list of elements which signal potential hazard follows.

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